MINUTES OF DOT-AGC BRIDGE DESIGN SUBCOMMITTEE MEETING

The DOT-AGC Joint Bridge Design Subcommittee met on December 10th, 2003. Those in attendance were:

Greg Perfetti	State Bridge Design Engineer (Co-Chairman)
Allen Raynor	Assistant State Bridge Design Engineer
Paul Lambert	Structure Design Project Engineer
Tom Koch	Structure Design Project Engineer
Ron Hancock	State Bridge Construction Engineer
Berry Jenkins	Carolinas AGC
Chris Britton	Taylor and Murphy Construction Co.
Richard Holshouser	Sanford Contractors, Inc.
Mark Lively	Crowder Construction
Michael Dane	Dane Construction, Inc.
Art McMillan	Assistant State Roadway Design Engineer
Scott Hidden	Support Services Supervisor – Geotechnical Engineering Unit
Victor Chao	Structure Design Engineer
Gichuru Muchane	Structure Design Engineer
Adam Shannon	Triplett-King & Associates
Merritt King	Triplett-King & Associates
Dave Wissell	Dave Wissell, PE, PL
Mark Robbins	Ralph Whitehead Associates
Kevin Bailey	Ralph Whitehead Associates
Allyson Orr	Ko & Associates
Roberto Nunez	North Carolina State University
Emmitt Sumner	North Carolina State University
Amir Mirmiran	North Carolina State University

During the review of the minutes of the October 8th, 2003 meeting, the following items were discussed:

1. *Pile Hammer Energies*
   Contractors had concerns that some of the pile hammer energy ranges stated in the plans were so large that different equipment would be necessary to drive the piles depending on the actual energy required. This makes bidding very difficult for the contractors. Mr. Hancock stated that it was his understanding that the lowest pile hammer energy in the range was sufficient to drive the piles. Therefore, any equipment that has a pile hammer energy within the range would be capable of driving the piles. *Mr. Jenkins requested that a note be added to the plans reflecting this clarification.*

2. *Culvert Diversion*
   Contractors had requested a lump sum method of payment for all culvert diversion work. This change would provide contractors the flexibility to complete the culvert diversion in the most efficient way. Mr. Hancock stated that if culvert diversions were not constructed as shown on the plans, then a permit modification would probably be required.

3. *Slope Protection Elevations*
   Mr. Hancock reiterated the importance of providing elevations and offsets at the ditchline to allow contractors to stake out the slope protection prior to the roadway section being completed. Mr. McMillan stated that the Roadway Standards show the roadway shoulder flaring out towards the ditch under the bridge. However, sometimes the shoulder tapers to meet the ditch. This makes staking out the ditchline and slope protection more difficult on new locations. Construction stated that they would work with the Roadway Unit to improve the detail under the bridge. *Structure Design agreed to issue a policy memorandum to require that this information be shown on the plans.*

The minutes of the October 8th, 2003 meeting were approved.

The following items of new business were discussed:

1. *Overhang Falsework Research*
   Dr. Sumner gave a presentation on a Department funded prestressed girder overhang falsework research project currently in progress at NC State University. The presentation outlined the project scope and objectives. Dr. Sumner sought contractors' and consulting engineers' comments on present DOT requirements, research scope and on any issues (e.g. constructibility) that need to be considered in the research.

   Contractors suggested investigating if the amount of temporary rebar that is welded across the top to the girders is really needed. Contractors stated that they preferred reusable temporary steel 'X' diaphragms in lieu of the generally non-reusable timber struts that are currently used, and that those diaphragms should incorporate jacks to account for different prestressed girder sizes. Mr. Chao stated that he had completed a preliminary investigation on temporary steel diaphragms, and that his work indicated that steel diaphragms could be spaced at 20 ft. – 40 ft. Contractors were in favor of this spacing range, especially since the timber struts are installed at a relatively close spacing. Contractors noted that the inserts used to install temporary diaphragms should not interfere with the prestressing strands.

   Mr. Chao presented a summary on some preliminary tables that he had developed to standardize the spacing of overhang falsework brackets. Contractors inquired if the tables were based on a specific manufacturer's product. Mr. Chao stated that the tables were developed based on manufactures' bracket load rating of 4500 lb. and 6000 lb. brackets, and therefore could be used for any manufacturer's bracket system. After some discussion, it was agreed to proceed with developing the charts for the 6000 lb. brackets only.

   Mr. Koch stated that the Department had approved standardized brackets installed with the hanger rod passing through the top flange of the modified bulb-tee (MBT) girders, as well as hangers that are installed on the edge of the top flange. The Unit is currently trying to fund a separate research project to load test various bracket types to better understand their behavior and capacities.

   Contractors suggested that the researchers consider accounting for the concrete placed in the bay adjacent to the overhang, since that load would counteract some of the loads in the overhang and possibly allow for a larger overhang bracket spacing. Contractors also stated

that NCDOT is one of a few states that thicken the slab in the overhang and detail two drip beads on the bottom of the overhang slab. Mr. Perfetti recognized that current policy resulted in heavy overhangs and *stated that Structure Design was in the process of reviewing the policy*.

Contractors inquired if the research project would review the formwork that supports the screed, walkway, and supports the wet concrete. Dr. Sumner stated that they would review the formwork to the extent that it affected the falsework, but they would not be reviewing the specific construction of the formwork.

Ms. Orr of Ko & Associates stated that North Carolina is one of the few states that does not allow metal stay-in-place (SIP) forms to be considered as a tension component, and that perhaps research could address that issue.

Consulting engineers suggested investigating design issues that affect constructibility. For example, in staged construction projects, the adjacent girders for each stage sometimes end up being too closely spaced for falsework installation and removal. Another suggestion was to consider placing further limits on the overhang width on heavily skewed bridges because the effective overhang is very large.

2. *Waiting Period for Drilled Piers*
   Mr. Dane had requested guidelines and/or clarification on the waiting period between placing drilled pier concrete and placing column concrete. Mr. Hancock, referring to the NCDOT *Standard Specifications for Roads and Structures*, section 420-20, stated that the waiting period was 12 hours for erecting the column formwork and 24 hours for placing the column concrete. Mr. Dane agreed that the *Standard Specifications* provided sufficient guidelines.

3. *Cleaning Weathering Steel*
   Mr. Hancock addressed concerns that had been raised by Mr. Ronald Shaw of Lee Construction Co. The specific concerns were sand blasting weathering steel, contractors having to revisit the project site due to several uncoordinated punch lists, and cleaning rust stains on the substructure. Mr. Hancock stated that sand blasting the girders is not required. However, the Construction Unit would like to have the girders cleaned of all contaminants, but they do not specify how contractors should complete the work. He stated that the steel should be cleaned immediately after the deck concrete is poured. On the punch list concern, Mr. Hancock stated that the inspectors do provide preliminary punch lists especially on projects that are completed early.

   Mr. Holshouser noted that the numerous punch lists is more of a problem with the roadway portion of the project.

   Mr. Jenkins suggested that it would be helpful to the contractors if the various agencies involved would coordinate their punch lists. He stated that numerous punch lists have significant impact on small business profitability and viability, which is inconsistent with the move toward awarding contracts to more small businesses.

4. *Lump Sum Projects*

Mr. Perfetti stated, that for all cored slab bridges that require an offsite detour, the Department was considering letting on a lump sum basis. Mr. Hancock stated that there are three trial projects now underway that were bid on a lump sum basis. Based on the experience with this change, other bridge types may also be included in the future.

Contractors noted that these types of projects tend to be the smaller projects and therefore they did not see any problems. However, they suggested that erosion control and other environment related pay items not be paid on a lump sum basis.

Mr. McMillan suggested that all quantities continue to be included in the plans since this information will be helpful to the contractors when preparing their bids. Mr. Perfetti noted that a form letter for coordination/notification with Roadway would be distributed to the Project Engineers.

Mr. Jenkins inquired if any design-build projects will be bid on a lump sum basis. Contractors noted that modifications to permits are more difficult on design build projects, especially if the project footprint is modified. This limits the contractor's options and opportunities to be innovative. Mr. Britton stated that he is aware of three current design-build bridge replacement projects in Hendersonville, NC that were a poor choice for a lump-sum project, as they will probably cost more than if they had not been lump-sum projects.

5. *Precast Box Culverts*

Mr. Koch informed the committee that NCDOT will soon lift the moratorium on the use of precast box culverts. The moratorium does not permit use of precast box culverts in the eastern part of the state, and reduced fill heights from 20 ft. to 10 ft. in locations where their use was permitted. However, with the lifting of the moratorium new guidelines for installing precast culverts have been developed. These include:

- Precast culverts located in Divisions 1-4, 6, & 8 shall have a 10 ft. fill height limit,
- Precast culverts located in Divisions 5, 7, & 9-14 shall have a 15 ft. fill height limit,
- All precast units must be jacked together using hydraulic jacks,
- External wraps will be required over the joints,
- Revised fabrications tolerances must be met, and
- A 1 in. maximum gap will be permitted for fabrication shop fit-up.

Mr. Koch stated that cast-in-place (CIP) box culverts will always be an option on the plans and that the Division will always have the final determination on using precast boxes. Mr. Jenkins inquired if permit submissions will reflect the precast option. Mr. Perfetti responded by stating that permits shall allow the CIP option and the permit modifications should be the responsibility of the contractor. However, the option to seek a permit modification will not apply if the permit commitment states a precast option only. Mr. Hancock noted that on several projects, contractors have requested approval to replace precast culverts with CIP culverts.

6. *Feedback on Slip-forming Barrier Rails*

Ms. Diane Highsmith, President – Watts Barrier Walls, had raised some concerns regarding the revised New Jersey shape barrier rail width. Mr. Holshouser reported that he had spoken

with Boss Construction about these concerns, and that they did not think that Ms. Highsmith's concerns are a big issue since Boss Construction has the equipment to form the revised barrier rail and can work within the revised tolerances.

Mr. Holshouser reminded the committee that in the past barrier rails were formed without an overhang, and they were not aesthetically pleasing. Consequently, a 1 ½" overhang between the rail and the edge of slab was provided to account for irregularities in the slip-forming process. Contractors added that, over time, the bottom of the barrier rail mold tends to spread out. For this reason and to provide an adequate working tolerance, a 1" minimum overhang is preferable. *Mr. Perfetti stated that Structure Design would review the barrier rail details and increase the overhang to more readily accommodate slip forming.*

7. *Other*
   i. Mr. Hidden passed out an interim special provision for submittal of working drawings to the Geotechnical Unit. He noted that the Geotechnical Unit has undergone a reorganization and has decentralized operations to regional offices. However, the western regional office is not yet operational, and therefore submittals on new and active projects in Divisions 8-14 should be sent to the Raleigh office. Mr. Hidden noted that a final document would be issued once all regional offices are operational. He also requested feedback on the submittal process as the Geotechnical Unit would like to streamline and speed up the process, and avoid confusion.

   ii. Mr. Jenkins informed the committee that there is a move to eliminate treated wood products due to the environmental hazard created by the treating chemicals.

   iii. Mr. Britton stated that on several projects there has been no consistency in the requirements for the end caps of CSL tubes. The inconsistencies make it difficult to purchase the appropriate length of pipe, especially in situations where the drilled pier is over drilled. Mr. Britton also inquired why contractors are sometimes required to submit CSL tube installation procedures when the exact procedures are stated in the NCDOT *Standard Specifications*.

   iv. Mr. Holshouser stated that safety vests now required on projects in new locations with no traffic are often a hazard to the construction workers. The vests tend to get hung up and/or snag on formwork, temporary safety railings, and other equipment. Worker visibility is not a major issue since there is no traffic. Mr. Hancock noted that the construction workers would still need to be clearly visible to crane and other equipment operators.

   v. Mr. Hancock also requested for volunteers for the upcoming bridge building competition regionals on February 27, 2004. Mr. Jenkins noted that Mr. Henry Stikes of the Consulting Engineers Council (CEC) is retiring, and so Mr. Hancock may want to seek renewed support and commitments from the private firms for this effort.

8. *Next Meeting*
   The next meeting is scheduled for February 11th, 2004 in the Structure Design Unit conference Room C. Tentative dates for all of the AGC 2004 meetings are: April 7th, June 9th, August 11th, October 6th, and December 8th.